

REMARKS/ARGUMENTS

Reconsideration of the application is requested.

Claims 1-5 remain in the application. Claim 6 has been cancelled.

In item 2 on pages 2-6 of the above-mentioned Office action, claims 1-5 have been rejected as being unpatentable over Hara (US Pat. No. 5,498,902) in view of Lim et al. (US Pat. No. 5,773,878) and Reusch (US Pat. No. 4,534,105) under 35 U.S.C. § 103(a).

As will be explained below, it is believed that the claims were patentable over the cited art in their original form and the claims have, therefore, not been amended to overcome the references.

Before discussing the prior art in detail, it is believed that a brief review of the invention as claimed, would be helpful.

Claim 1 calls for, inter alia:

a lead frame having an island with a base area supporting said integrated circuit, a ratio between the base area of said integrated circuit and the base area of said island being from 0.7 to 0.9 for avoiding flexure of said housing;

said integrated circuit and said island embedded in said housing so that a thickness of a housing region above said integrated circuit is substantially equal to a thickness of a housing region below said island.
(Emphasis added.)

In order to calculate the ratio between the area of an IC and the area of the die pad on which the IC is bonded, the Examiner has used the dimension of a die pad of 14 mm x 14 mm as disclosed by Lim et al. and subtracted the minimum clearances for the die bonding and wire bonding of 5 mil and 15 mil, respectively, as taught by Reusch from each side of the die pad to calculate the base area of the IC.

The detailed calculations of the Examiner are as follows:
die pad area:

$$14 \text{ mm} \times 14 \text{ mm} = 196 \text{ mm}^2$$

chip area:

is smaller than the die pad by the above clearances on each side. Using the conversion values given by the Examiner for the clearance values of 5 mils = 0.125 mm:

$$(14 - 2 \times 0.125) \times (14 - 2 \times 0.125) = 13.75^2 = 189.0625 \text{ mm}^2,$$

15 mils = 0.370 mm:

$$(14 - 2 \times 0.370) \times (14 - 2 \times 0.370) = 13.26^2 = 175.8276 \text{ mm}^2.$$

The corresponding area ratios are $189.0625 / 196 = 0.965$ for the 5 mils clearance and $175.8276 / 196 = 0.897$ for the 15 mils clearance. The ratio of 0.897 for the 15 mils clearance is within the claimed range 0.7 to 0.9.

However, it must be noted that the clearance of 5 mils is required to prevent adhesive overflow and the clearance of 15 mils is required for wire bonding (see column 1, lines 12-41 of Reusch). Since in the invention of the instant application no wires are bonded to the support pad/die pad, it is believed that it is not justified to use the value of 15 mils to calculate the area ration. Rather, only the 5 mils of clearance can be used because in the invention of the instant application only the clearance for adhesive overflow has been considered. This clearance leads to the above calculated area ratio of 0.965 which is outside of the range of 0.7 to 0.9 as claimed by the invention of the instant application.

Nowhere does Reusch teach or suggest using the clearance necessary for wire bonding when the smaller clearance 5 mils can be used. On the contrary, the object of Reusch is to avoid having such a large clearance.

Further, even if the Examiner insists on using the larger clearance value of 15 mils for wire bonding, it is believed

that it is not justified to calculate the chip area by subtracting the clearance for bonding from each side of the die pad. Fig. 1 of Reusch shows only one wire bond 32b connected to the die pad 22. Therefore, the clearance of 15 mils for wire bonding should only be subtracted from one side of the die pad. The clearances on the other sides of the die pad are the 5 mils clearances needed to prevent adhesive overflow.

The chip area should, therefore, be calculated as:

$$(14 \text{ mm} - 2 \times 5 \text{ mil}) \times (14 \text{ mm} - (5 + 15) \text{ mil}) = (14 \text{ mm} - 2 \times 0.125) \times (14 - (0.125 + 0.370)) = 185.69375 \text{ mm}^2.$$

This leads to an area ratio of 0.947. Again, this is outside of the range of 0.7 to 0.9 as claimed by the invention of the instant application.

Applicants strongly disagree with the Examiner's statement that it would have been obvious to a person of ordinary skill in the art to arrive at a ratio between the base area of the IC and of the die pad of 0.7 - 0.9.

It can be shown by a simple calculation that in order to obtain an area ration of 0.7, the clearance on each side of the die pad has to be about 45 mils. Compared to the minimum

required clearance to prevent adhesive overflow of 5 mils, this is 9 times as much. No person skilled in the art would at any time use 9 times as much space for clearance as is necessary. This is especially true in semiconductors where space is at a premium and every effort is made to reduce the size of the ICs to reduce costs and to increase the integration level. Indeed, Reusch teaches reducing the die pad dimensions (see column 3, lines 37-49). A suggestion to waste space by having a clearance 9 times greater than necessary would meet with strong opposition by a design engineer.

It should be noted that the required clearances taught by Reusch were given over 20 years ago and have very likely been reduced to smaller values today due to the advances of the technology. The clearances taught by the invention of the instant application are, therefore, likely to be even higher than 9 times the minimum required clearances and therefore even more unlikely to be chosen by a person skilled in the art. None of the prior art references provides any hint for such large clearances.

It is accordingly believed to be clear that none of the references, whether taken alone or in any combination, either show or suggest the features of claim 1. Claim 1 is,

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therefore, believed to be patentable over the art and since all of the dependent claims are dependent on claim 1, they are believed to be patentable as well.

In view of the foregoing, reconsideration and allowance of claims 1-5 are solicited.

In the event the Examiner should still find any of the claims to be unpatentable, counsel would appreciate a telephone call so that, if possible, patentable language can be worked out.

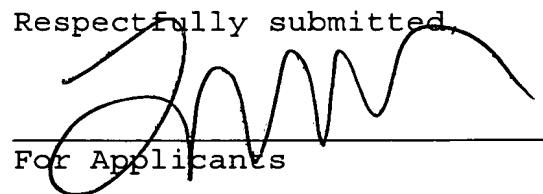
Petition for extension is herewith made. The extension fee for response within a period of one month pursuant to Section 1.136(a) in the amount of \$110.00 in accordance with Section 1.17 is enclosed herewith.

Please charge any other fees which might be due with respect to 37 CFR Sections 1.16 and 1.17 to the Deposit Account of

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Lerner and Greenberg, P.A., No. 12-1099.

Respectfully submitted,


For Applicants

LAURENCE A. GREENBERG
REG. NO. 29,308

YC

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Lerner and Greenberg, P.A.
Post Office Box 2480
Hollywood, FL 33022-2480
Tel: (954) 925-1100
Fax: (954) 925-1101